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10/721,578	11/24/2003	Chih-Ming Lin	67,200-1158	5800

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EXAMINER	
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ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 06/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/721,578	LIN ET AL.	
	Examiner	Art Unit	
	Steven H. Rao	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment

Applicants' amendment filed on March 20, 2006 has entered and forwarded to the Examiner on March 22, 2006.

Therefore claims 1,6,11 and 16 as amended by the amendment and claims 2-5,7-10, 12-15 and 17-20 as previously recited are currently pending in the Application.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1- 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention Amended independent claims 1, 11 and 16 as amended by the amendment recite " a metal silicide layer formed over and electrically connected with the conductor contact region" and dependent claims 2- 5 and 7-10, 12-15 and 17-20 depend therefrom.

Applicants' specification identifies contact region/conductor contact region 12 in Application drawings as conductor contact region, and described in para 0020 of Applicants' specification as

(0020) The contact region 12 may be a conductor contact region (i.e., formed employing a conductor including but not limited to a metal, metal alloy, doped polysilicon (having a dopant concentration of from about 1E18 to about 1E22 dopant atoms per cubic centimeter) or metal silicide (doped polysilicon/metal silicide stack) conductor. Alternatively, the contact region 12 may be a semiconductor contact region formed employing a semiconductor material including but not limited to less highly doped silicon, germanium and silicon-germanium alloy semiconductor materials (i.e., from about 1E14 to about 1E16 dopant atoms per cubic centimeter).

Therefore the Examiner"s reading of the above para 0020 is not able to locate any mention of the metal silicide layer being electrically connected with the conductor contact region.

It is request that Applicants' and their attorneys particularly point out and show where the above describes a metal silicide layer being electrically connected with the conductor contact region.

It is further noted that none of figures 1-5 show the element 12 (alleged to be conductor contact region) is specifically isolated from the metal silicde layer (17,17a or 18) by the conductor barrier layer (14, 14a- para 0022 and 0023). Therefore metal silicde layer (17 , 17 a or 18) is specifically not in electrical contact with the conductor contact region (12) .

Further "(0022) The series of blanket layers comprises: (1) a blanket conductor barrier layer formed upon the substrate having formed therein the contact region 12; (2) a blanket metal silicide forming metal layer 16 formed upon the blanket conductor

barrier layer 14; an optional blanket undoped polysilicon layer 18 formed upon the blanket metal silicide forming metal layer 17 and (4) a blanket first doped polysilicon layer 20 of a first polarity formed upon the optional blanket undoped silicon layer 18.

(0023) The blanket conductor barrier layer 14 may be formed of conductor barrier materials as are conventional in the microelectronic product fabrication art, including but not limited to nitrides metal silicide forming metals such as but not limited to titanium, tungsten, cobalt, nickel, platinum, vanadium and molybdenum. The blanket conductor barrier layer 14 may be formed employing methods as are conventional in the art, to provide the blanket conductor barrier layer 14 of thickness from about to about angstroms. Preferably, the blanket conductor barrier layer 14 is formed of a titanium nitride conductor barrier material formed to a thickness of from about 100 to about 200 angstroms."

Therefore conductor contact region (12) is not electrically connected to metal silicide layer (17, 17a 0r 18) because of the presence of the intervening barrier layer (14, 14a).

Drawings

The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81(c). No new matter may be introduced in the required drawing. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d).

If Applicants' are able to show that "a metal silicide layer formed over and electrically connected with the conductor contact region" is not new matter than as All of Applicants' present drawings (a single sheet containing figs. 1-5) do not show the claim recitation "a metal silicide layer formed over and electrically connected with the conductor contact region", therefore if this recitation is entered new drawings are required showing these recitations.

The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC Section 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 to 20 are rejected under 35 U.S.C. 103(a) as being obvious over Knall et al. (U.S. Patent No. 6,420,215, herein after Knall).

With respect to claim 1 Knall to the extent understood, describes an anti-fuse structure comprising : a substrate having formed therein a conductor contact region, (Knall fig. 1 #10, col. 2 line 60, it is inherent that every contact region be conductive other the purpose of the contact region i.e. to provide connection between two or more parts will be lost if the contact region is not conductive) a metal silicide layer formed over and electrically connected with the conductor contact region, (Knall fig. 1 # 14) a first doped polysilicon layer formed upon the metal silicide layer, (Knall fig. 1 # 15) an anti-fuse material layer formed upon the first doped polysilicon layer; (Knall fig. 1 # 20)

and a second doped polysilicon layer formed upon the anti-fuse material layer. (fig. 1 # 21 , col. 3 line 60).

With respect to claim 2 Knall describes the anti-fuse structure of claim 1 wherein the metal silicide layer is formed from a metal selected from the group consisting of titanium, tungsten, cobalt, nickel, platinum, vanadium and molybdenum metals. (Knall col.3 lines 23-27) .

With respect to claim 3 Knall describes the anti-fuse structure of claim wherein the anti-fuse material layer is formed from an anti-fuse material selected from the group consisting of amorphous silicon materials, amorphous carbon materials and dielectric materials. (Knall col. 3 lines 40-58).

With respect to claim 4 Knall describes the anti-fuse structure of claim I wherein a doped polysilicon layer is not formed interposed between the contéct region and the metal silicide layer. (Knall figures 1,3,5, etc.)

With respect to claim 5 describes the anti-fuse structure of claim fudher comprising a barrier layer formed interposed between the contact region and the metal silicide layer and contacting the metal silicide layer. (Knall col.5 lines 35-47, dielectric layer) .

With respect to claim 6 Knall describes an anti-fuse structure comprising: a substrate having formed therein a conductor contact region, a metal silicide layer formed over and electrically connected with the conductor contact region, a first doped polysilicon layer of a first polarity formed upon the metal silicide layer; an anti-fuse material layer formed upon the first doped polysilicon layer, and a second doped

polysilicon layer of a second polarity opposite the first polarity formed upon the anti-fuse material layer. (Knall figure 3 it is inherent that every contact region be conductive other the purpose of the contact region i.e. to provide connection between two or more parts will be lost if the contact region is not conductive, and for reasons se tout under claim 1 above).

With respect to claim 7 describes the anti-fuse structure of claim 6 wherein the metal silicide layer is formed from a metal selected from the group consisting of titanium, tungsten, cobalt, nickel, platinum, vanadium and molybdenum metals. (rejected for reasons set out under claim 2 above).

With respect to claim 8 Knall describes the anti-fuse structure of claim 6 wherein the anti-fuse material layer is formed from an anti-fuse material selected from the group consisting amorphous silicon materials, amorphous carbon materials and dielectric materials. (rejected for reasons set out under claim 3 above).

With respect to claim 9 Knall describes the anti-fuse structure claim 6 wherein a doped polysilicon layer is not formed interposed between the contact region and the metal silicide layer. (rejected for reasons set out under claim 4 above).

With respect to claim 10 Knall describes the anti-fuse structure of claim 6 further comprising a barrier layer formed interposed between the contact region and the metal silicide layer and contacting the metal silicide layer. (rejected for reasons set out under claim 5 above).

With respect to claim 11 Knall describes a method for forming an anti-fuse

structure comprising: providing a substrate having formed therein a conductor contact region, forming a metal silicide layer over and electrically connected with the contact region, forming a first doped polysilicon layer upon the metal silicide layer, forming an anti-fuse material layer upon the first doped polysilicon layer; and forming a second doped polysilicon layer upon the anti-fuse material layer. (Knall col.3 lines 29 to col. 4 lines 37 and for reasons set out under claims 1,6 etc. above).

With respect to claim 12 Knall describes the method of claim wherein the metal silicide layer is formed from a metal selected from the group consisting of titanium, tungsten, cobalt, nickel, platinum, vanadium and molybdenum metals. (rejected for reasons set out under claims 2, 12).

With respect to claim 13 Knall describes the method of claim 11 wherein the anti-fuse material layer is formed from an anti-fuse material selected from the group consisting of amorphous silicon materials, amorphous carbon materials and dielectric materials. (rejected for reasons set out under claims 3,13).

With respect to claim 14 describes the method of claim 1 1 wherein a doped polysilicon layer is not formed interposed between the contact region and the metal silicide layer. (rejected for reasons set out under claims 4,14).

With respect to claim 15 Knall describes the method of claim fudher comprising forming a barrier layer interposed between the contact region and the metal silicide layer and contacting the metal silicide layer. (rejected for reasons set out under claims 5, 10).

With respect to claim 16 Knall describes a method for forming an anti-fuse

structure comprising: providing a substrate having formed therein a conductor contact region, forming a metal silicide layer over and electrically connected with the condcutor contact region, forming a first doped polysilicon layer of a first polarity upon the metal silicide layer, forming an anti-fuse material layer upon the first doped polysilicon layer, and forming a second doped polysilicon layer of a second polarity opposite the first polarity upon the anti-fuse material layer. (rejected for reasons set out under claims 1,6 and 11, etc. above).

With respect to claim 17 Knall describes the method of claim 16 wherein the metal silicide layer is formed from a metal selected from the group consisting of titanium, tungsten, cobalt, nickel, platinum, vanadium and molybdenum metals. (rejected for reasons set out under claims 2,12 above).

With respect to claim 18 describes the method of claim 16 wherein the anti-fuse material layer is formed from an anti-fuse material selected from the group consisting amorphous silicon materials, amorphous carbon materials and dielectric materials. (rejected for reasons set out under claims 3, 13).

With respect to claim 19 describes the method of claim 16 wherein a doped polysilicon layer is not formed interposed between the contact region and the metal silicide layer. (rejected for reasons set out under claim 5, 10 above).

With respect to claim 20 describes the method of claim further comprising forming a barrier layer interposed between the contact region and the metal silicide layer and contacting the metal silicide layer. (rejected for reasons set out under claims 5,15 above).

Response to Arguments

Applicant's arguments filed 3/22/ 2006 have been fully considered but they are not persuasive for the following reasons.

Applicants' arguments that they have made meaning full amendment to claim is not persuasive because as stated above the addition" conductive " to contact region does not meaningfully change the scope of the claims because it is inherent that every contact region be conductive other the purpose of the contact region i.e. to provide connection between two or more parts will be lost if the contact region is not conductive.

Applicants' argument that Knall fails to teach/describe a conductor contact region, and a metal silicide layer formed over and electrically connected with the conductor contact region (assuming new matter rejection is overcome) is taught by the applied references a shown above.

Therefore all pending claims (i.e. 1-20 are finally rejected).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (571) 272-1718. The examiner can normally be reached on 8.00 to 5.00.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see hopr//pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Steven H. Rao

Patent Examiner

May 26, 2006.

LONG PHAM
PRIMARY EXAMINER